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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/002,175	12/05/2001	Neal M. Bowen	M4065.0493/P493	2267

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EXAMINER

EDMONDSON, LYNNE RENEE

ART UNIT PAPER NUMBER

1725

DATE MAILED: 07/02/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/002,175

Applicant(s)

BOWEN, NEAL M.

Examiner

Lynne Edmondson

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-- Th MAILING DATE of this communication app ars on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 05 December 2001.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-57 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-57 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 21 February 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 5.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Drawings

1. The corrected or substitute drawings were received on 2/21/02. These drawings are acceptable.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 1-9, 14-39, 42-44 and 47-49 are rejected under 35 U.S.C. 102(a) as being anticipated by Chen et al. (US 2003/0042621 A1)

Chen teaches a wire bonded structure (figure 4) comprising a first wire bonding area (114), a second bonding area (122) and a third bonding area (133) provided on three stacked components (118, 114, 112); a first wire bond between the first and second bonding areas (134), a second wire bond (130) between the second and third bonding areas and at least one of the bonds at the second area being on top of the other bond at an angle (figure 4) which may comprise daisy chain (paragraph 2). The

components are integrated circuit chips (112, paragraphs 1 and 71) and may be arranged in a planar configuration (figure 7D). A ball bond is present at one end of the first and second bonds (138, 124) with a bump at the other end (132, paragraph 71, particularly final 11 lines and figure 7C). Figure 7D shows a ball bonded to the bump (206, paragraph 74). The wire bonds are gold wire bonds (paragraph 5). A wire bonding method is taught wherein first and second wire bonds are formed between the first, second and third components such that at least one ball bond is formed and at least one bump is formed (paragraphs 71 and 74). A wire bonding apparatus is taught comprising a wire feeding device (capillary) and a mechanism for moving and operating the device for forming multiple bonds. The apparatus is capable of forming bonds at an angle (paragraphs 8 and 74). See also Chen claims 1-35.

4. Claims 1, 5, 6, 10-17 and 42-57 are rejected under 35 U.S.C. 102(b) as being anticipated by Fujishima (USPN 6148505).

Fujishima teaches a wire bonded structure (13A-13C) comprising a first wire bonding area (40), a second bonding area (AP) and a third bonding area (BP) provided on three planar components (A, B, 40); a first wire bond between the first and second bonding areas (40 to AP), a second wire bond between the second and third bonding areas (AP to BP) and at least one of the bonds at the second area being on top of the other bond (figures 13C and 19 and col 2 lines 1-15). The components may also be stacked (figure 9). The components are integrated circuit chips (col 2 lines). As shown in figures 4, 11A, 11B, 14 and 15, an imaginary line drawn along the longitudinal line on

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the second bond is not parallel to the same such line drawn on the first bond (col 4 lines 35-44, col 6 lines 12-19 and lines 43-67). A wire bonding apparatus (figure 1) is taught comprising a wire feeding device (capillary, 2) and a mechanism for moving and operating the device for forming multiple bonds via a controlled drive unit (col 3 line 50 – col 4 line 11). The control unit comprises a computer and software (program, col 9 lines 37-45) for measuring (determining) and positioning the capillary accordingly and is capable of forming bonds at an angle (col 5 lines 18-55). See also Fujishima claims 1-6.

5. Claims 42-57 are rejected under 35 U.S.C. 102(b) as being anticipated by Nagaoka et al. (USPN 5292050).

Nagaoka teaches a wire bonding apparatus comprising a wire feeding device (capillary, col 3 lines 55-68) and a mechanism for moving and operating the device for forming multiple bonds via a computer program controlled drive unit (figure 3). The control unit comprises a computer and software (program, col 2 lines 8-68 and col 4 lines 37-68) for measuring (monitoring) and positioning the capillary accordingly and is capable of forming bonds at an angle (figures 4-7, col 5 line 45 – col 6 line 32). See also Nagaoka claims 1-8.

6. Claims 1-4, 7, 8, 10-17, 24-27, 31-33 and 42-57 are rejected under 35 U.S.C. 102(e) as being anticipated by Yin et al. (US 2003/0049882 A1).

Yin teaches a wire bonded structure (figures 4 and 6) comprising a first wire bonding area (83), a second bonding area (24) and a third bonding area (52) provided on three stacked components (20, 80, 30); a first wire bond between the first and second bonding areas (90), a second wire bond (76) between the second and third bonding areas and at least one of the bonds (76) at the second area being on top of the other bond (figure 6). The components are integrated circuit chips (paragraphs 6 and 19-20). A ball bond is present at the end of the first and second bonds (72, 92). As shown in figure 3, an imaginary line drawn along the longitudinal line on the second bond is not parallel to the same such line drawn on the first bond (paragraph 5). A wire bonding method is taught wherein first and second wire bonds are formed between the first, second and third components such that at least one ball bond is formed (paragraph 31). Wire bond 76 connects the ball bond (72) to the bump (56) (figure 6, paragraph 24). A wire bonding apparatus is taught comprising a wire feeding device (capillary) and a mechanism for moving and operating the device for forming multiple bonds via a computer programmed, controlled drive unit. The apparatus is capable of forming bonds at an angle (figure 3 and paragraphs 2, 4, 5 and 7). See also Yin claims 1, 7, 15, 18, 24, 29-31, 38, 48 and 51.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 40, 41, 45, 46 and 50-57 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chen et al. (US 2003/0042621 A1) in view of Hortaleza et al. (USPN 6131792).

Chen teaches a wire bonded structure (figure 4) comprising a first wire bonding area (114), a second bonding area (122) and a third bonding area (133) provided on three stacked components (118, 114, 112); a first wire bond between the first and second bonding areas (134), a second wire bond (130) between the second and third bonding areas and at least one of the bonds at the second area being on top of the other bond at an angle (figure 4) which may comprise a daisy chain (paragraph 2). The components are integrated circuit chips (112, paragraphs 1 and 71) and may be arranged in a planar configuration (figure 7D). A ball bond is present at one end of the first and second bonds (138, 124) with a bump at the other end (132, paragraph 71, particularly final 11 lines and figure 7C). Figure 7D shows a ball bonded to the bump (206, paragraph 74). The wire bonds are gold wire bonds (paragraph 5). A wire bonding method is taught wherein first and second wire bonds are formed between the first, second and third components such that at least one ball bond is formed and at least one bump is formed (paragraphs 71 and 74). A wire bonding apparatus is taught comprising a wire feeding device (capillary) and a mechanism for moving and operating the device for forming multiple bonds. The apparatus is capable of forming

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bonds at an angle (paragraphs 8 and 74). However, there is no disclosure of a computer program for monitoring and controlling movement.

Hortaleza teaches a wire bonding method and apparatus, which forms bonds at an angle (figures, 2b, 3b and 5b and col 2 lines 51-67) comprising a capillary (col 1 lines 14-35) moved by a programmed computer (col 3 line 50 – col 4 line 12). See also Hortaleza claims 1 and 5-11.

It would have been obvious to one of ordinary skill in the art at the time of the invention to employ computer control for capillary positioning (Chen paragraphs 8, 39 and 43) and thereby achieve interconnection of a plurality of high density interconnections (Chen paragraph 2) in a reliable manner which prevents damage to the chip (Chen paragraph 6).

Conclusion

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Kondo (JPN 07-202069-A, stacked structure), Eldridge et al. (USPN 6110823, stack structure, ball), Pollock (USPN 5054194, planar structure), Takiar et al. (USPN 5502289, stacked structure and apparatus), Toh et al. (USPN 6091140, planar structure, angle and apparatus), Park et al. (US 2002/0064905 A1, planar and stacked structure, ball bonds and apparatus), Akram (US 2002/0030263 A1, planar and stacked structure and apparatus), Chuo et al. (USPN 6457235 B1, structure, two bumps), Biggs et al. (USPN 5702049, apparatus, capillary, computer,

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program, measuring means) and Huddleston et al. (USPN 5498767, apparatus, capillary, computer, program, measuring means).

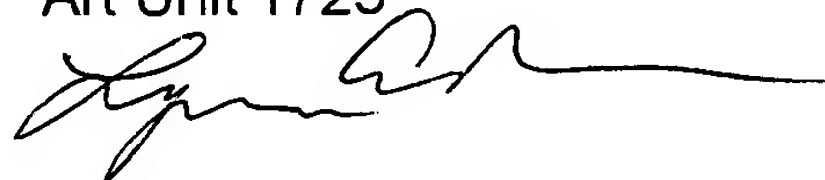
10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lynne Edmondson whose telephone number is (703) 306-5699. The examiner can normally be reached on Monday through Thursday from 6:30 a.m. to 5 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Dunn can be reached on (703) 308-3318. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 305-7718 for regular communications and (703) 305-7115 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0651.

LRE
June 25, 2003

Lynne Edmondson
Examiner
Art Unit 1725



6/25/03